

Description of a new subspecies of *Pieris extensa* Poujade, 1888 from north Yunnan, China, and clarification of the seasonal forms in the species (Lepidoptera, Pieridae)

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Abstract *Pieris extensa yunnansia* ssp. nov., a new subspecies of *P. extensa* Poujade, 1888, from north Yunnan, China is described and illustrated. In the course of the description, spring and summer forms in *P. extensa* are clarified and identified.

Key words *Pieris extensa*, *Pieris extensa bhutya*, *Pieris extensa* var. *eurydice*, *Pieris extensa yunnansia* ssp. nov., Systematic, Taxonomy.

Introduction

Pieris extensa (Fig. 3-“22”) was described as a variety of a new species *Pieris erutae* in the same paper by Poujade (1888). The type locality of both *erutae* and *extensa* is the same place “Mou-pin”, the former name of *Baoxing* in Sichuan Province of China. The wing expanse of *extensa* (♂ 70 mm) was far larger than *erutae* (♂ 55-62 mm). Leech (1891) treated *extensa* as a distinct species and described a new variety of it *P. extensa* var. *eurydice* (Figs 4-“7~10”), which was rather larger than ssp. *extensa* as 80-86 mm in males, from Central China. But var. *eurydice* was later treated as a synonym of ssp. *extensa* by Eitschberger (1984).

Pieris extensa bhutya Talbot, 1939 (Figs 4-“11~16”) from Bhutan is the only subspecies recognized today. The nominotypical subspecies of *P. extensa* is distributed in the eastern skirts of the Tibetan Mts, (alt. 500-2,500 m), such as S-Shaanxi, W-Hubei and Sichuan Province, while ssp. *bhutya* is found in the very limited area of eastern Bhutan indicated by Tadokoro *et al.* (2013). Recently we collected specimens of *P. extensa*, which were extremely compact in wing expanse, from north Yunnan in May. After detailed observation, we have come to understand that those butterflies are the spring form of *P. extensa* but have distinct morphological characteristics compared to both ssp. *extensa* and ssp. *bhutya*, on the basis of which we describe them as a new subspecies of *P. extensa*.

Materials and methods

Specimens of a new subspecies (Figs 1, 2-C) were collected at Zhongdian district (alt. 3,100 m) in north Yunnan, China in May 2009, 2012 and 2013 respectively.

The nominotypical subspecies of *P. extensa* in spring form (Fig. 2-A) was from Qinling Mts (alt. 1,100 m) in S-Shaanxi and collected in May, ssp. *extensa* in summer form (Fig. 2-B) was also from Qinling Mts (alt. 1,500-1,800 m) and collected in July, and ssp. *bhutya* (Fig. 2-D)

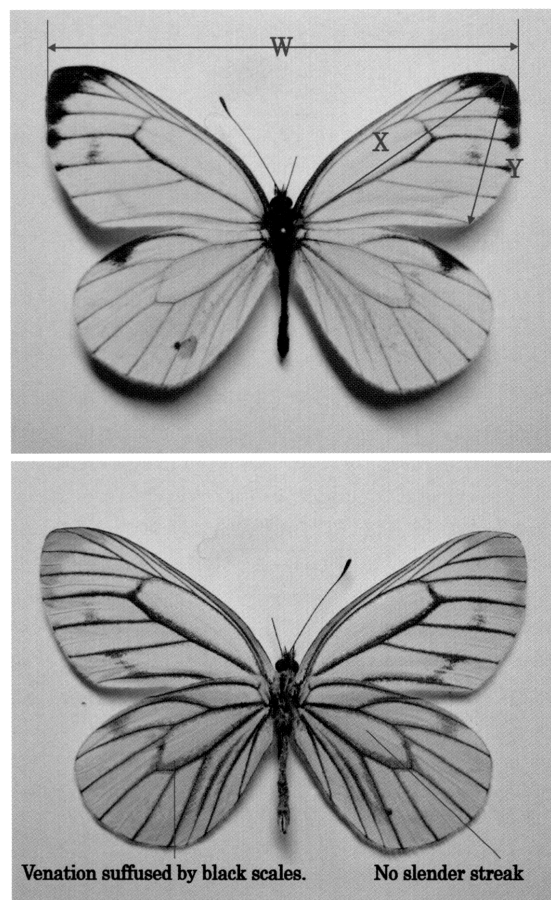


Fig. 1. *Pieris extensa yunnansia* ssp. nov. - Holotype.

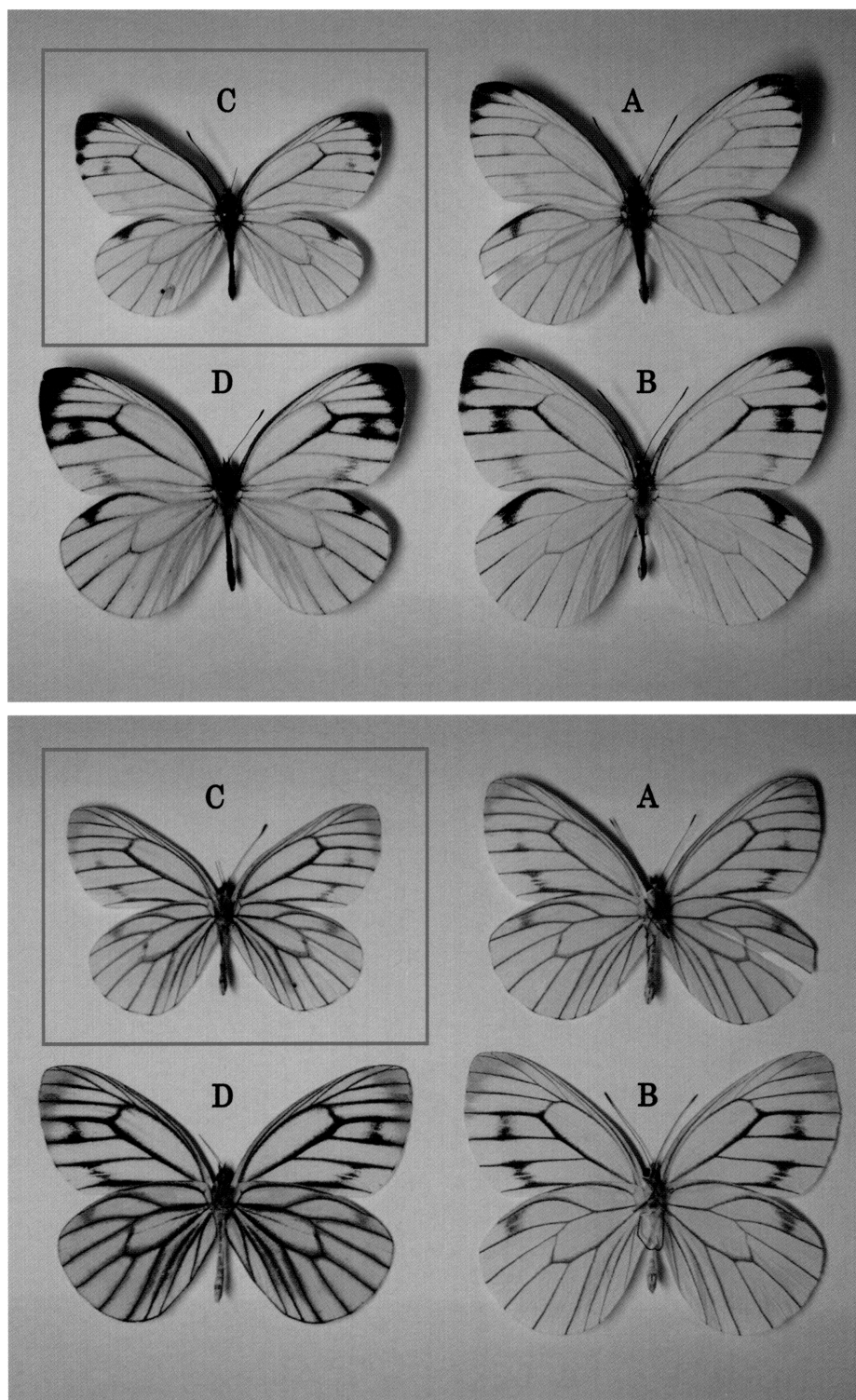


Fig. 2. *Pieris extensa* ♂ (A: ssp. *extensa* –spring form, B: ssp. *extensa* –summer form=var. *eurydice*, C: ssp. *yunnansia* –spring form, D: ssp. *bhutya* –summer form).

was from E-Bhutan and collected in July. Photographs of type specimens of *P. extensa*, *P. extensa* var. *eurydice* and *P. extensa bhutya* were referenced in Verity (1905-1911) (Fig.3) and Eitschberger (1984) (Fig. 4). Wing expanse (W) was measured as the maximum wingspan

of both forewings, assuming that the inner margin of both wings is set straight (Fig. 1). Slenderness of the forewing was compared by the ratio of X/Y (Fig. 1). The higher the ratio, the more slender the wing shape. We measured 9 specimens of ssp. *extensa*, one of

ssp. *bhutyia* and four of ssp. *yunnansia*, all in males. Androconia were removed from the male forewing upper side cell and observed by optical microscope at 400 magnifications. Male genitalia were dissected and observed by stereomicroscope at 20 magnifications after removing membranes and muscles with 20 % KOH solution.

Description

Pieris extensa yunnansia Tadokoro & Wang, **ssp. nov.** (Fig. 1)

Holotype ♂. Zhongdian district, Yunnan Prov., China (alt. 3,100 m), 02 V, 2009; Paratypes 1 ♂. same locality, 22 V, 2012, 2 ♂. same locality, 30 V, 2013.

The holotype specimen of *Pieris extensa yunnansia* will be deposited in the South China Agricultural University, Guangzhou and a paratype specimen will be deposited in The University Museum, The University of Tokyo. (The rest of the paratype specimens remain in the Tadokoro collection.)

- Wing expanse (spring form in male): short. 59-61 mm in males (Fig. 1).

- Wing shape (spring form in male): slender (Fig. 1). X/Y ratio 1.74-1.78. (1.75 in holotype).

- Wing markings (spring form in male): Wings white with the venation blackish. Black markings at apex and space 6 of hind-wing prominent. Black marking at spaces 1b and 3 of forewing upper side fainted and sometimes disappearing. Forewing cell is pure white on both upper and underside. Forewing underside white but apex and costa pale yellow. Ground color of hind-wing underside pale yellow. Basal spot of space 8 vivid yellow. Wing markings of upper side resembling ssp. *extensa* (Fig. 3-“22”), but the veins of hind-wing suffused by black scales. No black slender streak in the cell (Figs 1, 2).

- Androconia (spring form): Wide variations in lamina and unstable. Some lamina have both arms pointed like a bird's beak (Fig. 5).

- Male genitalia (spring form): Similar to ssp. *extensa* but compact (Fig. 6).

- Habitat: Zhongdian district in Yunnan Prov. of China (alt. 3,100 m) (Fig. 7).

- Season of occurrence: May, and considered as spring form. But summer form not found yet.

Etymology

The subspecific name “*yunnansia*” is derived from its habitat of Yunnan Province.

Remarks

Seasonal forms:

Our recent investigation indicates that *P. extensa* has two seasonal forms. The spring form occurs in May and the summer form from July to September. It is also indicated

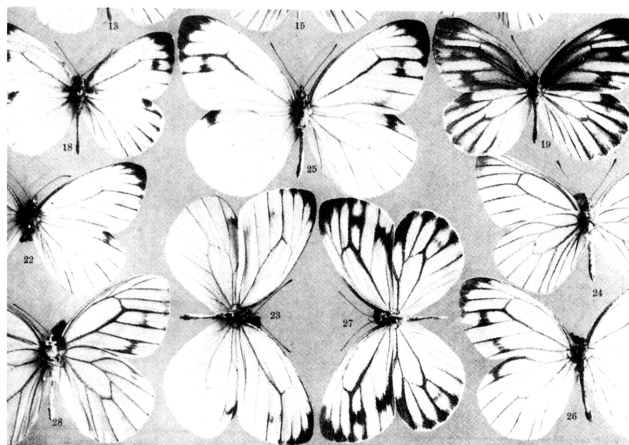


Fig. 3. *Pieris extensa* (22~24: ssp. *extensa*, 25~28: var. *eurydice*) [After Verity (1905-1911)].

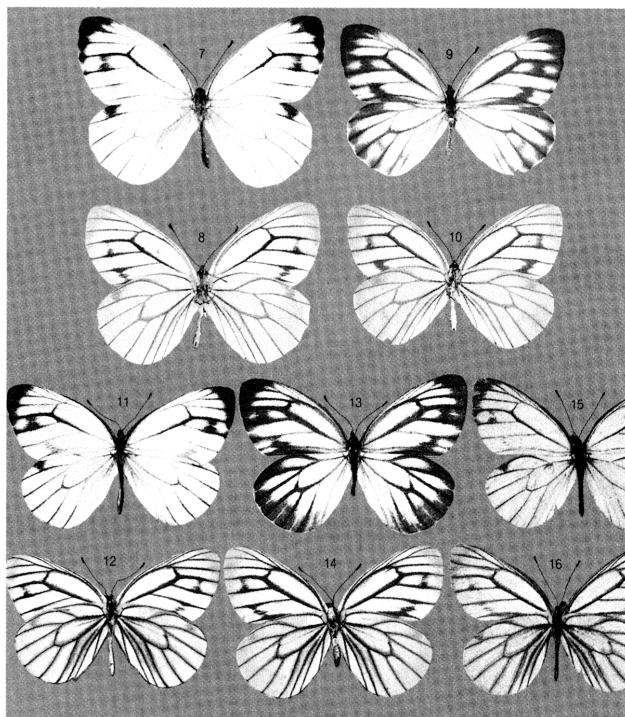


Fig. 4. *Pieris extensa* (7~10: var. *eurydice*, 11~16: ssp. *bhutyia*) [After Eitschberger (1984)].

that the type specimen of *P. extensa* Poujade, 1888 (Fig. 3-“22”) represents the spring form, and the type specimen of *P. extensa* var. *eurydice* Leech, 1891 (Fig. 4-“7~10”) represents the summer form. As var. *eurydice*

is treated as a synonym of ssp. *extensa* by Eitschberger (1984), var. *eurydice* is the summer form of ssp. *extensa*, rather than a local form. However, our investigation indicates that most of the specimens of *P. extensa* are summer forms, and that the number of spring form is

very limited. Subspecies *yunnansia* from N-Yunnan (Figs 1, 2-C) occurs in May and is considered as a spring form. However, we have surveyed Zhongdian district 3 times in May (2009, 2012 & 2013) and twice in July (2012 & 2013), and we have seen ssp. *yunnansia* only in May. We

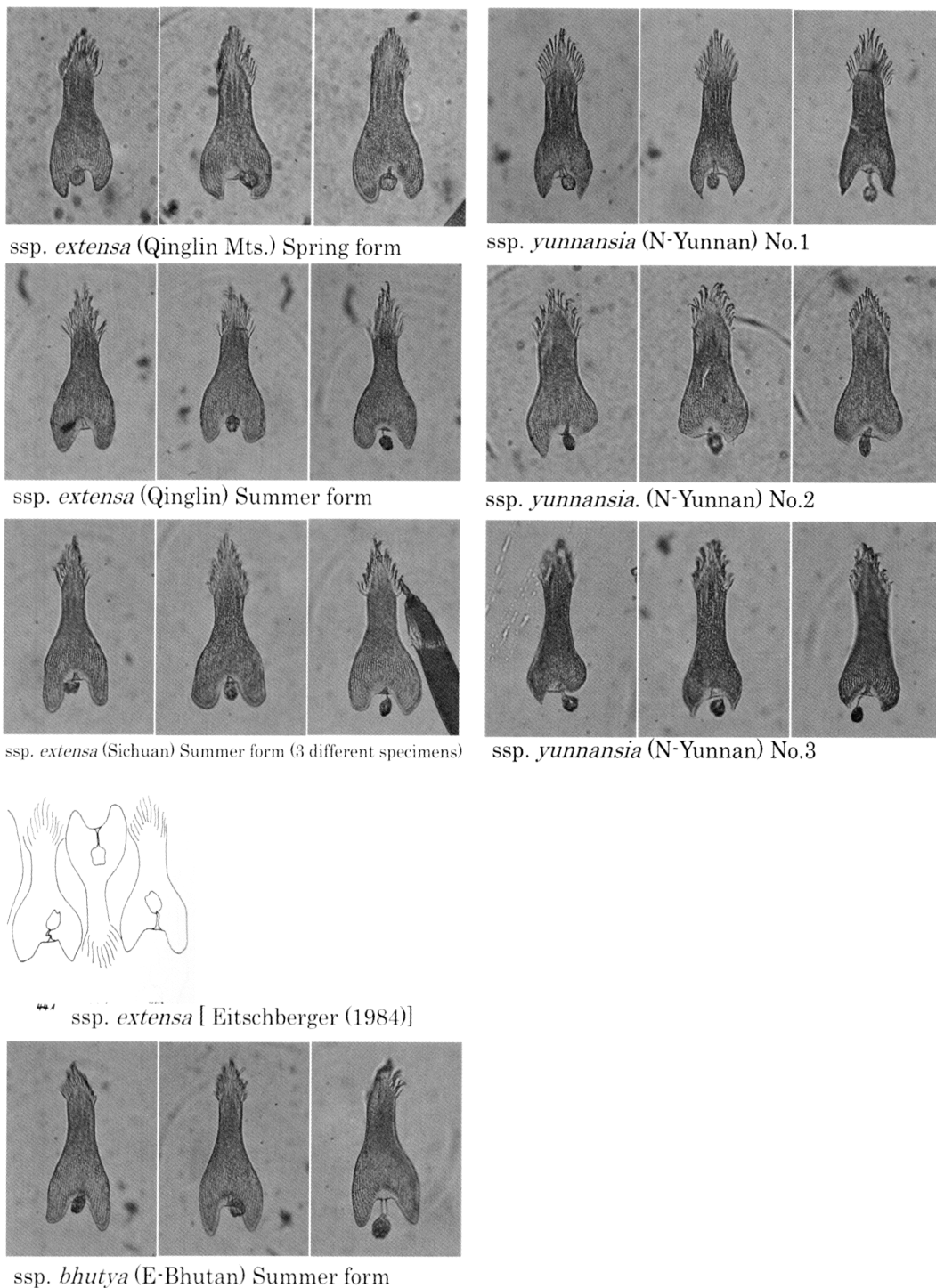


Fig. 5. Androconia of *P. extensa*.

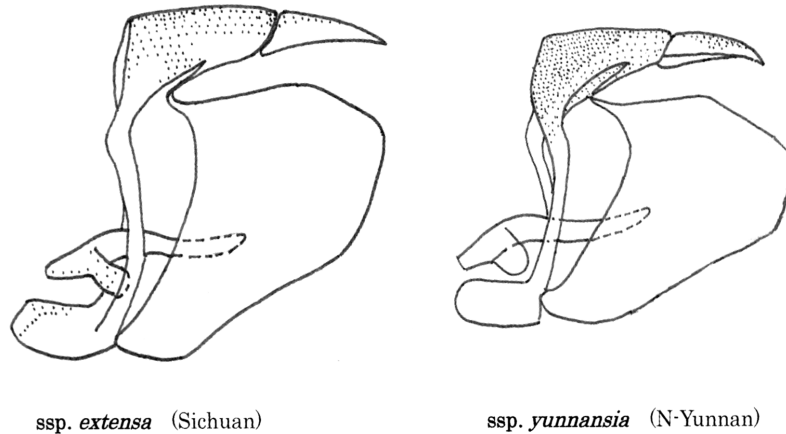


Fig. 6. Male genitalia of *ssp. extensa* and *ssp. yunnansia*.

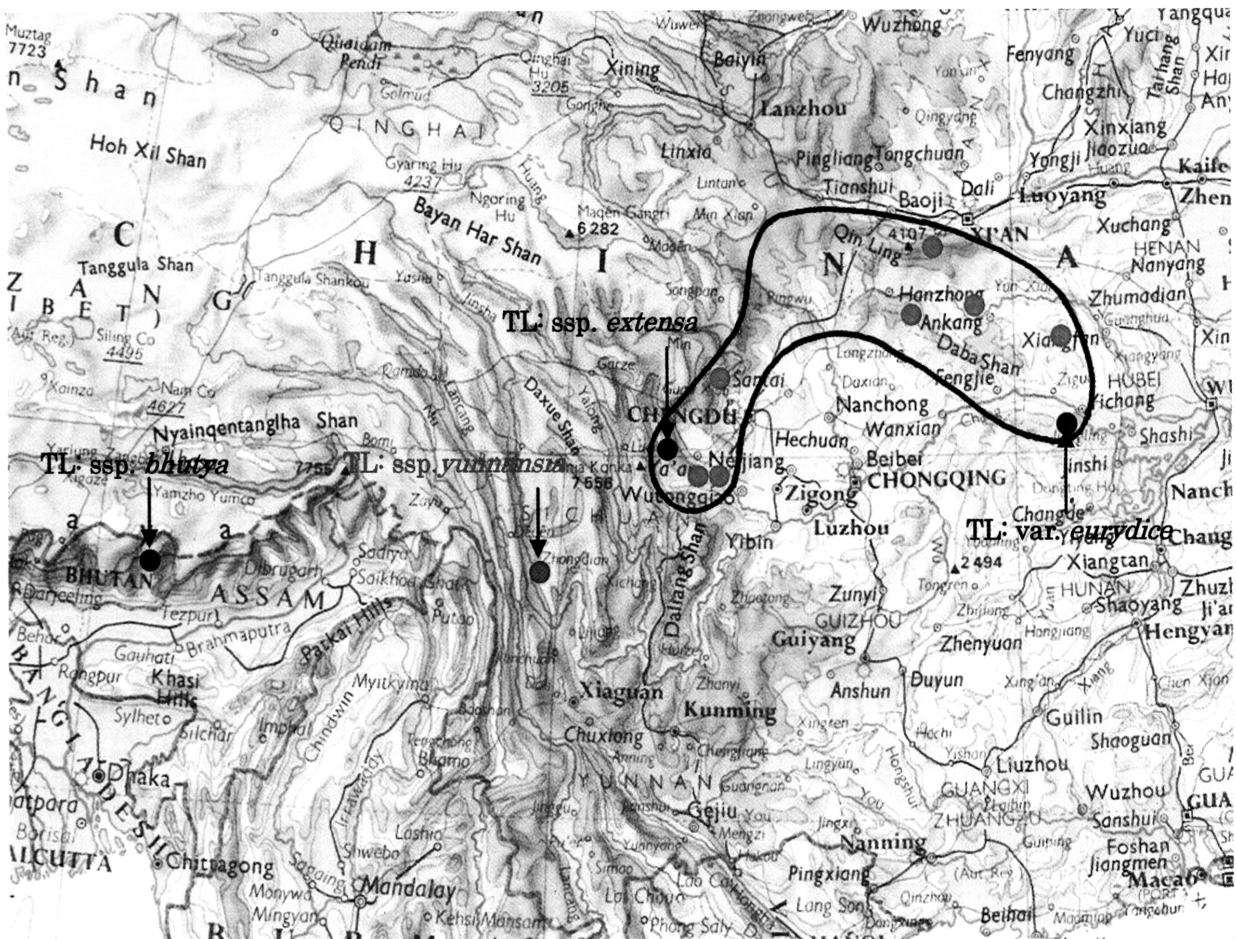


Fig. 7. Distribution and type localities of *P. extensa*.

are still uncertain whether *ssp. yunnansia* has a single generation occurring in May or two generations.

Wing expanse:

In spring forms: The type specimen of *P. extensa* from “Mou-pin” (former name of Baoxing in Sichuan

Prov.- Fig. 7) was 70 mm in male according to Poujade (1888) (Fig. 3-“22”). A spring form of *ssp. bhutya* from E-Bhutan was 64.7 mm in male according to Eitschberger (1984) (Fig. 4-“15~16”). And a specimen of *ssp. extensa* from Qinling Mts was measured as 64 mm (Fig. 2-A). The range of wing expanses in the spring form other than

in the new subspecies is 64-70 mm in males.

In summer forms: *P. extensa* var. *eurydice* were as large as 70-86 mm according to Leech (1891), 71.3-77.5 mm according to Eitschberger (1984) and 70-80 mm as measured by ourselves. Subspecies *bhutyia* from E-Bhutan was 72 mm according to Eitschberger (1984) and 70 mm as measured by ourselves (Fig. 2-D). The range of wing expanses in summer form is 70-86 mm.

The wing expanses of ssp. *yunnansia* at 59-61 mm in males are within the range of *P. erutae* and are the shortest wing expanses of *P. extensa* ever recorded (Fig. 2-C).

Wing shape:

The average X/Y ratio of ssp. *extensa* in summer form is 1.64 with the range of 1.60-1.69, ssp. *extensa* in spring form is 1.68, ssp. *bhutyia* is 1.67 and ssp. *yunnansia* is 1.75, with the range of 1.74-1.78, which indicates that the wing shape of ssp. *yunnansia* is the most slender among all forms of *P. extensa* (Fig. 2). However, the ratios also indicate that spring forms are more slender than summer forms in general (Figs 2, 3).

Wing markings:

Wing markings of ssp. *yunnansia* (Fig. 2-C) is similar to the spring form of ssp. *extensa* (Figs 2-A, 3-“22-24”) on the upper side, but is rather close to ssp. *bhutyia* (Figs 2-D, 4-“11-16”) on the underside, as the veins of the hind-wings are suffused with black scales. Wing markings on the underside indicate that the coloration of ssp. *yunnansia* lies between ssp. *extensa* and ssp. *bhutyia*, as venation is distinctly darker than ssp. *extensa* but not as dark as in ssp. *bhutyia*. Subspecies. *yunnansia* does not have a slender streak in the underside hind-wing cell, which appears in ssp. *bhutyia* (Fig. 2).

Androconia:

The shapes of lamina vary in every specimen of ssp. *yunnansia*, while they are uniform and stable in ssp. *extensa* (Fig. 5). No. 1 and No. 3 have both arms pointed like a bird's beak. No. 2 is short, fat and sometimes arms disappeared. The shapes of lamina in ssp. *extensa* are uniform and stable.

Habitats:

The nominotypical subspecies of *P. extensa* is distributed in the eastern skirts of the Tibetan Mts (alt. 500-2,500 m), such as S-Shaanxi, W-Hubei and Sichuan Province (Fig. 7-Enclosed by a thick black line). The habitat of ssp. *yunnansia* is isolated from ssp. *extensa* by a series of high Tibetan Mts such as Daxue shan and Kongga shan (Minja Konka: alt. 7,556 m), and also isolated from ssp. *bhutyia* (Fig. 7) by the folds of the Himalayas. In fact,

there is no record of *P. extensa* from the Assam region of India. We consider that ssp. *yunnansia* is an isolated population of *P. extensa* inhabiting at the limited high mountain area around Zhongdian district. Huang (1998, 2003) did not mention *P. extensa* in the course of his survey of Namjagbarwa region, Nujiang (Lou Tse Kiang) and Dulongjiang.

Conclusion

Based on its distinct morphological characteristics and isolated habitat stated above, we describe this butterfly as a new subspecies of *Pieris extensa*. We consider that ssp. *yunnansia* is the intermediate subspecies between ssp. *extensa* and ssp. *bhutyia*, judging from both wing markings and habitat.

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摘 要

中国雲南省北部産 *Pieris extensa* の新亜種記載 (田所輝夫・王 敏)

中国雲南省北部山岳地帯 (標高3,100 m) で5月に発生する超小型の *Pieris extensa* (Figs 1, 2-C) を精査したところ, それら個体群に共通して翅長や班紋 (Figs 1, 2) 発香鱗 (Fig. 5) 等に形態的な特徴が認められる上, 四川省産の名義タイプ亜種及びブータンをタイプ産地とする *P. extensa bhutya* の生息地とは地理的な隔絶が認められる事から, 雲南省 Zhongdian 地区をタイプ産地として *Pieris extensa yunnansia* (和名: ウンナンオオスジグロシロチョウ, 中国名: 大展粉蝶云南亚种) を亜種記載するものである. また同亜種の記載を通して「*Pieris extensa* には春型 (Fig. 2-A) と夏型 (Fig. 2-B) とがあり, Poujade (1888) が記載した *P. extensa* (Figs 3-“22~24”) は春型, Leech (1891) が記載した *P. extensa* var. *eurydice* (Figs 3-“25~28”, 4-“7~10”) は夏型の特徴を備えている」ことも同時に確認する事ができた. なお, この蝶は班紋及び生息地 (Fig. 7) から判断すると, ssp. *extensa* と ssp. *bhutya* (Figs 2-D, 4-“11~16”) との中間に位置する新亜種 (春型) と考えられる. 夏型の存在は現時点では確認されていない. ホロタイプ標本は中国広州の華南農業大学に, またパラタイプ標本は東京大学の総合研究博物館に保管する予定.

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